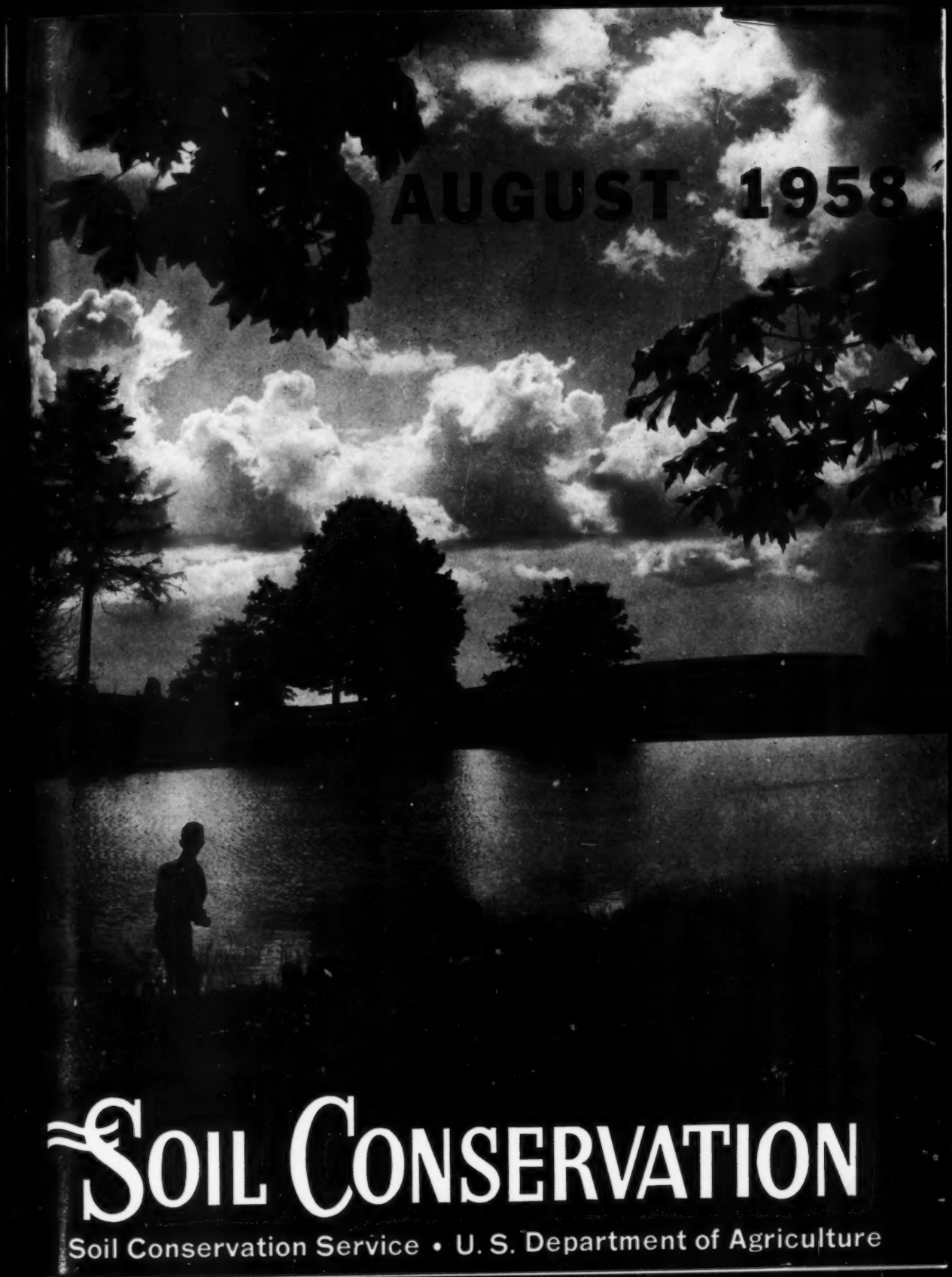

SOIL CONSERVATION

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U. S. DEPARTMENT OF AGRICULTURE, WASHINGTON, D. C.

★ THIS MONTH ★

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TOM DALE, Editor

SOIL CONSERVATION is published by direction of the Secretary of Agriculture as administrative information required for proper transaction of the public business. The printing of this publication has been approved by the Bureau of the Budget, July 18, 1955. SOIL CONSERVATION supplies information for workers of the Department of Agriculture and others engaged in soil conservation.

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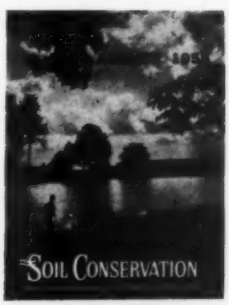
WATER INFILTRATION was cut in half when a legume-grass sod was turned under and the soil worked into a fine seedbed, according to a study by H. D. Ayers of the Ontario Agricultural College of Guelph, Canada.

With the loam soil protected by a legume-grass cover crop, the infiltration capacity was over 1.6 inches per hour during the first 60 minutes of simulated rainfall. But when the sod was turned under and worked into a fine seedbed, the infiltration rate dropped to .8 inches per hour.

Ayers thinks the initial infiltration on the bare soil was retarded mainly because of air being trapped in the soil. He points out that, even on the bare soil, the infiltration capacity was fairly good; but, intense summer rains may exceed the soil's capacity to take in water.

Editors are invited to reprint material originating in this magazine.



FRONT COVER—A spring fed pond stocked with trout in the Silver Creek Soil Conservation District, near Silverton, Oreg.

Photo by Frank G. Roadman

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A Look At Urbanization

By A. B. BEAUMONT

EAST, West, North, South! There is where I found it, urbanization of farm land, that is. I was asked to gather information on the nature and extent of the conversion of farmland to urban developments, how it is affecting soil conservation district activities, and the thinking of district supervisors and SCS personnel about the proper course of action in connection with it.

I had been an interested but rather casual observer for years of this kind of land use in my own State. I knew that it was proceeding fast locally, but I did not know that it was a nationwide, rapidly accelerating, land-use phenomenon. I was amazed at what I saw in some places.

The most rapid and intense recent housing development was noted at Norfolk, Va., where naval installations have mushroomed since World War II. Baltimore and Annapolis, Md. will probably have coalesed into one solidly built city within 25 years. In fact, this will be true of much of the Atlantic seaboard between Washington and Boston within 50 years. But I was more surprised to see the rapid urbanization in the Dallas-Ft. Worth and Houston areas of Texas. At the present rate of growth, Dallas and Ft. Worth will coalesce into one huge megalopolis within another third of a century.

In carrying out my assignment, I traveled in 12 States, east, west, north, and south, saw what was happening, and talked with 203 persons informed on the subject. Of these, one-third were soil conservation district supervisors, a little more than that were SCS personnel, and the remainder included county agents, specialists in agriculture, planning board directors, and others acquainted with the situation. The States visited were Massachusetts, Connecticut, Rhode Island, New Jersey, California, Oregon, Illinois, Michigan, Maryland, Virginia, Georgia, and Texas. The purpose of this article is to summarize my observations and the information obtained in interviews.

Because of improved highways and relatively cheap motor transportation, urbanization is no longer confined to fairly concentric circles around cities, as was formerly the case. It often develops in more or less isolated spots or areas where conditions are favorable. In southeastern Michigan, with its hundreds of lakes, a lakeside is often the starting point of a housing development. Large industries, distributing houses, or government facilities are often the nuclei of clusters of housing projects. Good examples of such development were seen in Virginia and Texas. In all States the strip or "shoestring" developments alongside of highways were seen.

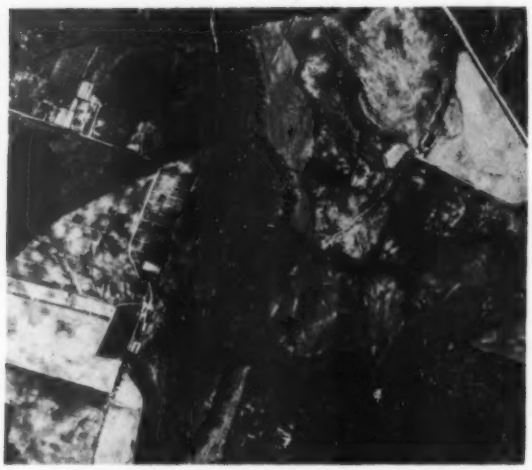
All types of soil and land are being occupied in the process of urbanization. Largely because of lower construction costs, preference is usually given to level or nearly level land, free from

THE BIG PUSH!

Note:—The author made this study while he was a consultant of the Soil Conservation Service. Formerly he was State Conservationist of SCS for Massachusetts.

stones, and clear of trees and brush. This is especially true in case of housing developments. In the selection of industrial sites, location usually seems to be the controlling factor. Hills are leveled and swamps filled, regardless of cost. Good examples of this were noted in eastern Massachusetts.

The high cost of valuable agricultural land is not much, if any, deterrent in taking land for industrial sites. Outstanding examples of this were seen in Bergen County, N.J. where a vegetable farm of 22 acres was sold for $12,000 an acre, and in the Los Angeles River Valley, where an alfalfa and bean farm of 132 acres was sold for $20,000 an acre. Some of the best examples of good land use in locating housing developments were noted in Georgia, in which Class VII (forest) land was occupied. Such land often landscapes beautifully.



The urbanization of a Maryland valley: (above) an aerial view of the valley when it was a farming community; (below) the same valley after a housing development had been completed.

A multitude of uses are being made of diverted land. The largest single percentage goes into housing developments. A large percentage goes into industrial sites, shopping centers, school sites, recreation parks and fields, airports, drive-in theaters, and filling stations. Also highway right-of-ways account for a large percentage.

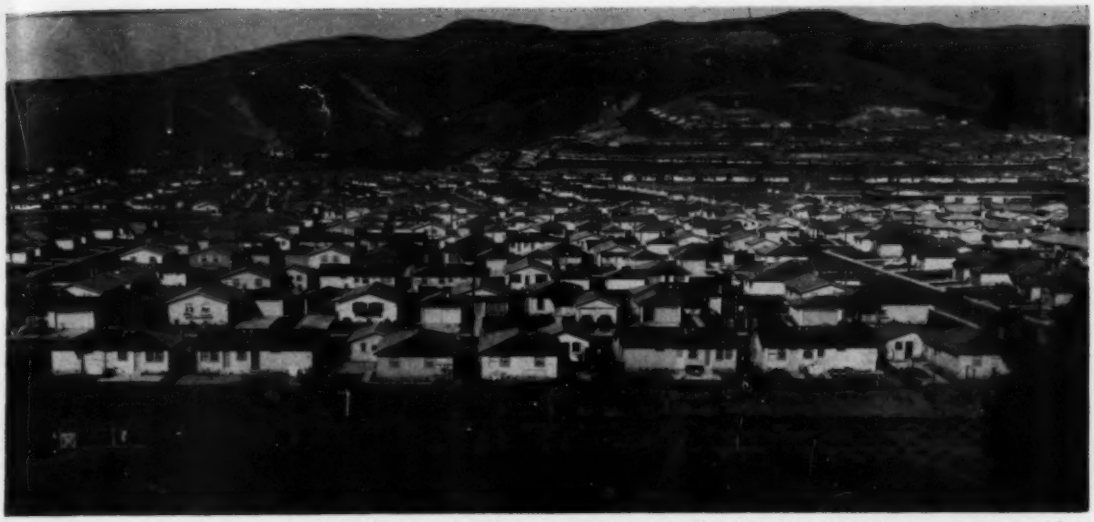
A farm of 140 acres near Peabody, Mass., about 15 miles north of Boston, which was under a district conservation agreement, is being converted into a large shopping center. About 70 stores will be constructed. A Boston paper last summer carried an article which stated that three downtown Boston stores "which represent over 100 years of successful retailing" have closed. Many shoppers, on account of congested traffic and parking problems are abandoning city stores for outside shopping centers. Some cities are fighting this trend with their urban renewal projects.

Urbanization of farmland, of course, reduces the quantity of food locally produced in the urbanized areas. The loss of farms makes this inevitable. For example, in Randolph Township in Morris County, N.J. recently there were 27 herds of 7 or more cows each. Within a year the total cow population had shrunk to 40 cows.

Local vegetable production has decreased in the area surrounding many cities. A good example of this was found in Genesee County, Mich., in which the city of Flint is located. In that county the number of acres of vegetables harvested decreased from 1,433 in 1944, to 816 in 1954; and, the corresponding figures for fruit were 3,292 and 2,276.

But no one is complaining about a shortage of food. There is none. If local farmers fail to supply the market, food comes in from other, often distant, areas to fill the vacumn. Some people complain about the high price of food, but no one is charging it to urbanization. Belford Seabrook, of Seabrook Farms, N.J. said he thinks the pinch will eventually be felt first because of the high cost of transportation rather than the amount of food available.

The total taxes paid by real estate have in-



Urbanization developments, especially housing projects, usually are on fairly level land, while steeper slopes of less productive land remain idle.

creased because of urbanization. This is due to an increase in the tax rate or the assessed value or both. But in most cases it was due to increased tax rates. With the great demand for new school buildings, the extension of sewer systems, water supplies, and other urban utilities, increased taxes are inevitable. The total taxes on a farm of 152 acres near Los Angeles, Calif. increased from $4,000 in 1952 to $20,000 in 1956.

The strongest factor in determining taxes in most recently urbanized areas is the building and maintenance of new schools. Forty to fifty percent of the real estate taxes usually goes for schools. In many localities the tax rate has doubled or tripled within the past 10 years. A district supervisor in Hartford County, Conn. said the rate in his town had more than tripled within that period. In some areas there has been little, if any, change in assessment of farmland within recent years. Some assessors, especially those in areas still dominated by farming interests, give preferred treatment to farmland; but others are putting pressure on farmers to force them to sell. In the highly urbanized township of Monroe, Conn. farmland is assessed at $1,000 an acre; present selling prices are $1,000 to $1,500 an acre.

While the proximity of a farm to the consuming public is usually an advantage marketwise, it often has disadvantages otherwise. First, the prospect of a farmer's selling his land at urban prices is more or less demoralizing from the standpoint of farming. Much idle land was seen in all areas undergoing urbanization. Some of such land had been sold or optioned to real estate speculators. In some cases, the farmers were just waiting and hoping to harvest the unearned golden increment. Some soil conservation districts have lost a number of cooperators. Southeast Livingston District in Michigan formerly had 150 cooperators; now it has only about 50 active farms. Many full-time operators have taken jobs in industry and become part-time farmers. This was noted particularly in Michigan and Georgia.

Second, increases in taxes on farmland make it difficult for the farmer to make a profit. Attempts are being made, with more or less success, in several States to prevent or reduce such increases by special zoning legislation or the incorporation of farm municipalities. Most progress in agricultural zoning has been made in California. Within the limits of Los Angeles, "Dairy City" has been incorporated for protection of the dairy farmers.

Third, as a tobacco farmer and district supervisor in Hartford County, Conn. pointed out, it is difficult to farm with hordes of children from nearby housing developments running

Many new industrial plants are built on level farmland well away from cities in order to have plenty of space for buildings and parking grounds.

over one's farm. They damage crops, break down fences, tamper with equipment (may be injured), and pilfer produce. In northern Illinois some fields of tall corn were seen interspersed, checkerboard fashion, with housing or industrial developments, but in most areas farming declines sharply as urbanization advances.

In general, the consuming public is not much concerned about the loss of farmland because of urbanization. Belford Seabrook of New Jersey has been interested in this matter several years, and has made a number of talks to groups about it. He has reported general apathy on the part of the public. He said people will not be much concerned so long as food can be purchased at a reasonable price. William Heffert, Jr., editor of *Farm and Garden Magazine* suggested that perhaps the best way to interest the general public in scientific land use is to approach the people through their interest in conserving land for recreational uses and water supplies. These are topics in which they are now keenly interested.

The present pattern of urbanization, as seen in 12 States, is not the result of widespread planning. In most places, the great urban sprawl is, like Topsy, "just growing." In several States, notably California, Michigan, Illinois, New Jersey, and Virginia, county planning boards have an interest in the preservation of farmland and are making some progress through zoning. In most States, however, planning by city boards for the benefit of the cities is the only kind being done. The impression I obtained of the whole situation is that broad land-use planning is in a state of confusion. There is no general agreement as to objectives or how to reach them.

Should land-use capabilities be a major guide for planning? Should farmland be preserved by zoning regulations? These are some of the questions. The Monmouth County, N. J. Planning Board held a public hearing to consider the question of zoning for agricultural use. Leaders in agriculture were present. No one requested that land be zoned for agriculture, so the matter was dropped.

Through field contacts, I found that farmers differed considerably in their attitude toward zoning. Some, especially the younger ones with good businesses, and some for sentimental reasons, desired protection against the encroachment of urbanization. Most of them, however, are opposed to restrictions in the sale of their land and many of them want to see the day hastened when they can reap the golden harvest they have not yet been able to bring in. This latter viewpoint was definitely expressed by a district supervisor, a potato grower, in Rhode Island.

Many owners of farm property who derive their income from sources other than farming are genuinely interested in improving and conserving their land regardless of the income from it. These people need and get technical assis-

Much farmland in areas that are becoming urbanized lies idle; the owners wait for the golden harvest that will come when they sell the land for urban developments.

tance from SCS through local districts. Farm ponds, reforestation, and pasture improvement were found to be the practices most commonly in demand by rurbanites. For example, a wealthy lady in Fairfield County, Conn. was interested in sheep and wanted a pasture for them. Request for water diversion or drainage come from homeowners with wet basements. Part-time farmers request and obtain about the same type of service as is given full-time farmers. Finally, many city people with a home in the country or a farm, and knowing practically nothing about soils or land use, are just hungry for any information along these lines they can get.

From Portland, Oreg. to Ft. Worth, Tex., I found that a high percentage of requests for assistance come from rurbanites. This varied from about 10 percent to 80 percent. Included are part-time productive farmers and non-farming land occupiers. Following is a breakdown of requests received in one Massachusetts district: 50 percent from full-time productive farmers; 25 percent from part-time farmers; 20 percent from non-farming land occupiers having 3 acres or more of land; and, 5 percent from owners of small lots.

A rather general procedure in districts visited is for the district to enter into agreement with and help make a plan for those having 3 acres or more of land. Those with less than 3 acres are usually given only consulative service and a roughly outlined plan. One of the problems in working with rurbanites is that of finding a mutually acceptable time for the land occupier and the technician to get together. Many of the rurbanites want only weekend and holiday service. Some of the technicians have been able to adapt themselves to such a schedule without too much inconvenience. Others have tried it and later abondoned it because it was found too burdensome.

To the question of whether non-farming land occupiers are entitled to technical assistance through soil conservation districts, all persons quizzed, with one exception, gave an affirmative answer. In fact, assistance of some kind is now being given this group in all districts visited. One district supervisor in Illinois said technical assistance should be given to farmers only, but he hedged when asked what he would do in case an erosion problem was involved.

Reasons given to support the view that non-farmers are entitled to assistance were generally as follows: (1) All pay taxes and, therefore, help support the SCS. (2) All land, regardless of ownership or use, should be protected. This view was well-expressed by a supervisor in Connecticut when he said he thinks first of the land and second of its ownership. Practically the same view was voiced by a supervisor in California, who added that it was also good public relations. (3) Practices or the lack of them on land in urban ownership may seriously affect adjoining farmland. (4) If technical service is denied non-farmers, they would probably demand a similar service and would probably get it, so great and influential are their numbers. An area conservationist in northern Illionis said: "If we don't service these boys from La Salle Street (Chicago), they will develop their own service." With few exceptions, both district supervisors and technicians favored giving first priority to requests from productive, full-time farmers. A few supervisors thought that all requests should be handled in the order in which received.

Contour Strips Replace Stone Fences

By ALBERT E. NEWBY

CONTOUR stripcropping paid off where it counts most—in the milk pail—for Tony Hapanowich of Sherman, Conn. During the dry summer of 1957, most New England crops wilted in the field, while the Hapanowich family farm produced over 225 tons of corn silage on a piece of run-out native pasture.

Steep, rocky hillsides, divided into small fields by stone walls, are characteristic of western Connecticut. What to do with such pieces of land is the problem confronting many dairy farmers. Lime and fertilizer stimulate native grasses for spring and fall pasture. But, bluegrass and white Dutch clover rest during hot weather. Plowing and seeding such fields often result in a poor stand, with topsoil being washed downhill to pile up against a stone wall.

Note:—The author is work unit conservationist, Soil Conservation Service, Danbury, Conn.

Clearing trees and brush from the Hapanowich farm.

Tony Hapanowich had recently taken over the farm at the death of his father. All of the farm's flatland had been drained and was producing to its fullest. Three small, steep, rocky fields that commanded the view from the front porch presented a challenge. To get this hillside producing was Tony's aim; but, how to do it safely and within the budget was the question.

This was one of the problems discussed by Tony and the Soil Conservation Service man as they prepared a plan for the farm. To crop the slope within its capabilities would mean contour strips. For efficient strips, the stone walls would have to be removed. The expense of removing 2,535 feet of stone wall plus some 65 large elms growing in the walls could not be handled by the farm budget.

Tony applied to the County Agricultural Stabilization and Conservation Committee. They agreed to assist by paying 20 cents a foot for wall removal and $3 per acre for contour strips. Assured of $591, Tony began removing trees from the walls, helped by brothers Bob and Walt.

As fast as the trees were cut, they were hauled down the 15 to 19 percent slope by tractor—sometimes two tractors became necessary—and placed in a windrow. A hired bulldozer dug and shoved out field stones. Walls were either buried, or pushed into a nearby swamp. Several large elm roots, too tough for the 'dozer, had to be dynamited. Holes were filled and grading was completed by the bulldozer.

The new 28-acre field was laid out in strips about 100 feet wide. A rotation of 1-year corn and 5 to 7 years of hay was decided on. Alternate strips were treated with 12 tons of manure fortified with superphosphate. After plowing, 600 pounds of 10-10-10 fertilizer were applied and harrowed in. This was followed by 600 pounds of 10-10-10 in the planter.

When the drought came the contour strips trapped meager showers and held water close to the growing corn. The hillside yielded better than 15 tons of corn silage to the acre while Tony's neighbors were getting less than 10. And the young farmer didn't mind one bit to hear visitors call it, "the best-looking crop of corn in the whole of Fairfield County!"

Harvesting corn silage on stripcropped field of Hapanowich farm after stone fences and trees were removed.

SUBSOIL NUTRIENTS.—Tests with radioactive materials show that corn, on some soils, gets more than half the phosphorous it needs from the subsoil, if both the topsoil and subsoil have plenty of this plantfood, according to soil scientists of the University of Wisconsin. They think that potassium and other essential plant food elements may also be obtained largely from the subsoil.

Soil tests to find out fertilizer needs for crops have in the past been confined largely to tests of the plow layers of fields. The Wisconsin soil specialists contend that the fertility of the subsoil should also be taken into account in recommending fertilizer needs.

Future Farmers Of Oklahoma Compete On Conservation

By TOM T. HAMILTON

THE Oklahoma air was still and hot that August evening in 1955. The greenery of the grass on the golf course and the peace of a day drawing to a close perhaps had something to do with the birth of the idea.

As three men walked toward the buildings up the hill, where a big feed was being laid out for leaders of the next day's activities, the most prosperous of the three thought out loud: "Wish I could figure a way to spend some of my money to encourage soil conservation."

Soil conservation had naturally been the topic of conversation, because the other men were two of Oklahoma's leaders in that field. One was Leon J. "T-Bone" McDonald, assistant State conservationist, of the Soil Conservation Service, the other was Luther Nunley, SCS work unit conservationist in the Major County Soil Conservation District.

The prosperous man was Joe C. Scott, president of Bankers Service Life Insurance Company of Oklahoma City and former president of the State Board of Agriculture. Oklahoma's now-famous Future Farmers of America Soil Conservation District Contest was thus conceived on a golf course in western Oklahoma and has since spread to eight States by popular demand.

Much work went into the preparation of a formal plan and rules for the contest. The Future Farmers of America were chosen as the youth group to participate because a more workable plan could be built around it. A group of former Vo-Ag teachers, "turned" conservationists, did most of the job of preparing rules for the contest. They included R. H. Geick of Altus, Charles Kilpatrick of Bartlesville, Walter Jessee of Durant, and Ivan Dilley of Perry. Also, there was Ted Lehman of Chickasha (the only one without a Vo-Ag background). Each man developed his own plan for the contest. Then they met, took the best from each plan, and developed the final working plan. Their guiding philosophy was to "get youth into conservation."

The first annual event got off the ground in January 1956, after receiving the green light from State Vo-Ag supervisor, J. B. Perky, Joe C. Scott, the State Soil Conservation Board, and officials of the State Association of Soil Conservation Districts.

Competition is fierce between FFA chapters for the $500 top prize and trophy given each year. And it is fierce between local chapters in each of the State's 87 soil conservation districts where the winning chapter gets $50. Other cash awards are given for scrapbooks containing clippings, photos and programs, and for top-notch written reports of accomplishments, which each chapter competing must submit. An individual boy can win from $5 to $50 (depending on how he places in the final) for being one

Joe C. Scott, contest sponsor, presenting the first year's trophy to Paul Singleterry, president of the Marlow FFA chapter.

Note:—The author is educational assistant, Oklahoma State Soil Conservation Board, Oklahoma City, Okla.

of the 9 area winners in the soil conservation speech division—and he can rack up additional points for his chapter, too.

Many boys will go to almost any length to pile up points for their chapter. A bonus of 20 points is added to the chapter's total for each speech given to an organized group. One FFA member's mother was giving a baby shower to which 18 ladies had been invited. The son persuaded her to let his chapter's speaker make a little talk. When the ladies came for the shower, they got a 10-minute talk on the virtues of soil conservation—and the persistent youths earned 20 points for their chapter.

Chapters can earn points in a variety of ways: By cooperative activities with their soil conservation district, by signing-up new cooperators, with tours and demonstrations, Soil Stewardship Week activities, showing films, writing newspaper stories, putting on TV and radio shows, and supervising poster contests.

Many SCDs place conservation equipment with FFA chapters for them to schedule out to members and cooperators. The chapters collect rentals and maintain the equipment. Some chapters have bought equipment of their own to rent out.

Working relationships between FFA chapters and SCDs, up to now unheard of, have developed. The Calvin FFA chapter hand-stripped 1,000 pounds of Indiangrass seed and sold it to the local district when the district was badly in need of it to help farmers revegetate land. Broken Arrow FFA chapter planted a Bermuda-root, increase plot and sold over $4,000 worth of roots to district cooperators in one year. Valliant FFA chapter was deeded 160 acres of timber land as a memorial to Herman C. Stauter so that the FFA boys and others could learn how to be tree farmers.

Cooperators in Oklahoma SCDs have been on the increase since the contest started in 1956.

In one district an outstanding farm leader

Ted Wilkerson, FFA advisor at Marland (right), receives the winner's plaque for the 1956-57 contest from Hershel Burrus, executive director of the State Soil Conservation Board (left), while J. B. Perky, State supervisor of Vocational Agriculture, and Joe C. Scott look on.

was not a cooperator, and would have nothing to do with the SCD. But his son was an FFA member. The boy persuaded his dad that it would be a feather in the son's cap to win points for his chapter if his dad would sign up. The father was soon visiting with the work unit conservationist to find out what conservation is all about—and he is now a good cooperator.

Showings of conservation films have increased tremendously since the contest started. In most districts the WUC meets with all Vo-Ag teachers to work out cooperative plans at the beginning of the contest period in July. They decide on films to be shown and develop a schedule with the State SCS office. One film may be shown by 5 chapters during 1 week, which gets good mileage out of films. Films are shown not only to the chapter members but to many other groups.

According to the contest rules, an FFA chapter in an area not organized into a SCD could not compete. Oklahoma had one county not organized. The FFA chapters in this area launched an all-out campaign to organize a district. Thus, the Kingfisher County District was organized in December 1956!

Most chapters now have a memorandum of understanding with their SCD. One point covered is that many districts have virtually turned over to the FFA much of their educational activities. These include essay and poster contests for schoolchildren, conservation films, tours and demonstrations, TV and radio shows, speech contests, conservation benefits statements, and Soil Stewardship Week promotion.

The contest has been going nearly 3 years and is getting better all the time, conservationists and Vo-Ag officials agree. The 1955-56 event was won by the Marlow FFA chapter, with the speech division being won by George Langley of the Stroud FFA. The second annual event, which ended last summer, was taken by the Marland chapter. State conservation speech winner was Alfred Zavodny of the Perry FFA, who won over the other 8 area winners and won $50 for himself and points for his chapter.

The third annual contest will be over this summer. The speech division was completed in April, with Jerry Case from Marland the winner. This will mean more points for Marland, which won the contest last year. It is estimated over half the chapters in Oklahoma are competing for the $7,500 in prizes furnished by Bankers Service Life Insurance Company and Joe C. Scott.

FFA members from Amber, Okla., sprigging bermudagrass in a waterway as one of their activities in the soil conservation contest.

Ted Wilderson, Marland FFA advisor, says: "Through the contest, conservation's valuable lesson has been integrated into our complete school system through the 12 grades. All students have participated either in poster, speech, and essay contests, tours, prepared grass samples, or have seen films and displays. But most important of all the FFA boys, who will be our farmers of tomorrow, have been taught the value of soil conservation to our community.

"Warren Case, one of our farmers, says the most important benefits our community has received from our FFA activities is the increased interest in soil conservation among the young people. Even the small children, and he has a son 14 and a daughter 10, are asking about soil conservation.

"This day-after-day contact with the soil conservation program by our community, plus the thousands of people that live outside our community who have been reached by our activities, has already paid dividends in this short span of time, and its future effects can only be speculation."

Wilkerson sums up by saying, "Though we know we have benefited much, both as a chapter and as a community, we feel the effects of our program will have an influence in our community for many years to come."

T-Bone McDonald sums up the contest this way: "Until this came along, adults and districts worked together. When a man died, all the work of education had to be started on the new farm operator. Now when a new farm operator takes over he is already a 'cooperator.'

"The boys who learn conservation now, in 4 years of high school, will have it in their hearts all their lives. Even if they do not farm, they will always be advocates of soil conservation."

Some of the most ardent supporters of the contest, of course, are Vo-Ag officials themselves. State Vo-Ag head, J. B. Perky told his teachers recently, "Districts have helped us, and we have helped districts. We have emphasized many times that one of our biggest and most important jobs is to do everything we can to speed up the protection and improvement of our soil and water resources. THE BEST PLACE TO BEGIN IS AT HOME, IN YOUR OWN SCHOOL DISTRICT."

Soil Knowledge Orbits The Earth

By LLOYD M. ADCOCK

THE attendance of 26 contestants from 13 foreign countries at the annual National Land Judging Contest attests its dramatic value in stimulating interest in land management and proper land use.

In the farm area surrounding Oklahoma City, Okla. contestants gathered from schools and farms throughout the United States, and with the foreign visitors in the international division of the contest, they studied the physical features of the soil. They classified land according to its capabilities, and placed each parcel of land into the correct one of eight classes. Then they judged the proper use of each piece of land and selected necessary conservation measures.

The judging process is, in effect, to make an inventory of the soil, to learn to analyze land problems, and to make decisions regarding its wise and economic use.

Foreign contestants were enthusiastic about this contest method of teaching about soils. Francisco Palis of the Philippines said, "Land judging contests will attract interest among people. They will be eye openers for those who have little knowledge of the value of soil and water and the importance of conserving them."

In a land judging contest, the field becomes a classroom where the subject comes to life—even for the nonprofessional. Eavesdropping on a discussion among foreign visitors, we harvested a pithy summary of this concept. "We have had soils information crammed in our heads, but, we have never before had a method for bringing it out and making use of it."

Raymond Welpott, manager of Station WKY-TV, monetary sponsor of the event, presented a trophy to the international champion, Amin Subari of Indonesia, and medals to four others: Francisco Garcia-Ramos of Spain, the runner-up, Luis Llanos of Spain, third; John Selvaratnam of Ceylon, fourth; and Armando Garcia of Spain, fifth.

The international champion, Mr. Subari, had this to say about why he likes the contest idea, "Because this mass education is simple and interesting, yet sufficient enough to give contestants an idea of how important is the conservation of soil, it will work. Although the conditions in Indonesia and the United States are very different, the ideas and considerations in carrying out soil conservation work are nearly similar."

Prabir K. Ray who comes from India, where land is very important (since about 80 percent of the population live in villages and are employed in farming) said, "Propagation of knowledge about land to our vast mass of people on lines similar to land judging contests may be most useful."

"Because a land judging contest is very good

Note:—The author is program specialist, foreign training division, Foreign Agricultural Service, Washington, D. C.

program to teach about the soils, I hope we can establish it," said Sadik Deniz of Turkey.

A. H. M. Abul Hafiz, who was there from Pakistan stated, "It is in this way, that we can make our people conscious about land and its management."

"In my country, youth has more capacity in receiving the new ideas than the old farmers do. These farmers, generally speaking, are illiterate and rooted to the primitive agricultural practices. I think we can change the agricultural landscape through the young people. I have never before seen the tremendous amount of money, energy, and publicity utilized for spreading the gospel—Know Thy Land," were the comments of Landivaldo Mello Motta of Brazil.

Enthusiasm came also from Francisco G. Salazar of the Philippines, who said, "This method will teach the young people of our country to understand better the soil and its better use, and to conserve the soil for future generations."

The 26 contestants in the international division of the contest were sponsored by the International Cooperation Administration. Participation was a part of their study program developed by the U. S. Department of Agriculture and cooperating land-grant colleges.

"Participation of foreign visitors in the events, particularly their attendance at the leaders' dinner was inspiring to us," said William A. McGalliard of the Noble Foundation who spoke at a dinner where the visitors were honored.

At a chicken dinner held in the Woman's building of the Oklahoma State Fairgrounds, winners of the National 4-H Club division, FFA teams, and college teams were honored along with the international division.

WKY-TV, the Agricultural Extension Service, Soil Conservation Service, Vocational Agriculture departments, and a host of business firms cooperated in sponsorship.

Countries represented in addition to those mentioned were Afghanistan, Chile, Greece, Thailand, and Korea.

With so much enthusiasm shown by people from around the globe, it would seem that soil knowledge is set to orbit the earth.

Lloyd M. Adcock (left) and J. M. Ives of the Oklahoma Extension Service (right), pose with winners of the international division of the Land Judging Contest at Oklahoma City. The award winners are, (left to right), Amin Subari of Indonesia, Francisco Garcia-Ramos of Spain, Luis Llanos of Spain, John S. Selvaratnam of Ceylon, and Armando Garcia of Spain.

BIOLOGICAL CONTROL OF POTATO SCAB

No: 36

This is the thirty-sixth of a series of articles to appear from time to time in explanation of the various phases of research being conducted by the Department of Agriculture on problems of soil and water conservation.

by J. D. MENZIES

MILLIONS of dollars worth of crops are lost each year through damage from plant disease organisms that have accumulated in otherwise productive soil. These unseen enemies, in company with such other soil pests as nematodes, insects, and weeds can be thought of as problems in biological conservation and reclamation. They may be less obvious than sheet erosion, gullies, salt accumulations, or high water tables, but their effects on soil productivity are similarly harmful.

Soil-borne plant disease organisms are not only highly destructive but discouragingly difficult to control. The potato scab fungus is a good example. It has been feared by farmers and studied by pathologists for as long as potatoes have been cultivated. Yet, today, we are far from having a reliable and practical method for scab control. Let us look at the size of the problem and review our progress.

Scab occurs in all major potato areas of the world. Potato varieties differ in susceptibility, but few commercial varieties are resistant. The scab organism apparently exists in many strains and can mutate readily to adapt to changing conditions. It is a typical soil inhabitant, that is, it can live indefinitely in the soil in the absence of potatoes. Recent research has shown that this pathogen can grow and increase on the roots of many plants including cereals.

The standard recommendation for root disease control is rotation. But we know now that the best rotation practices often do little more in controlling scab than to slow down its rate of increase. Rotations are desirable in many other respects, but unless supplemented by other practices are not an adequate answer to potato scab.

How about resistant varieties? There is definite hope here, and several new resistant varieties have been developed in this country through the National Potato Improvement Program. They are being grown to some extent commercially, but it is difficult to combine scab resistance with the many other qualities demanded of a successful potato variety. Breeding for resistance to unspecialized soil-borne organisms is a complex proposition and there always remains the danger of new strains of the pathogen appearing to attack any resistant variety.

Acidifying the soil to a pH below 5.5 sometimes controls scab, particularly in our eastern States. Potato growers in areas where this treatment is known to work are fortunate. In the irrigated West it is usually found that impractically high rates of sulphur are needed to acidify the soil. Research has shown, also, that even when infested soil is brought to a pH as low as 4 scab may still be severe. So this method cannot be recommended without local trials.

Potato scab can also be attacked with chemical fungicides. At present only a few chemicals are good soil fungicides, and these are so expensive that they are useful only on high value crops such as nursery stock or truck crops. A soil fungicide treatment would need to cost considerably less than $50 per acre to be practical for use on potatoes.

The only fungicide now commercially available that comes close to doing this is pentachloronitrobenzene (PCNB). Under favorable circumstances PCNB will control scab for a per acre cost of $40 to $60. Often, however, much higher rates are needed on heavier or peaty soil. Also, the treatment is usually effective only for 1 year.

Since potato scab is peculiar in that the infection is confined to the tuber surface, it is

Note:—The author is microbiologist, soil and water conservation research division, Agricultural Research Service in cooperation with the Washington Agricultural Experiment Stations, Prosser, Wash.

not necessary to protect the entire root system. If fungicides can be applied in strips, so that only the tuber zone in the soil is treated, considerable saving in material can be made. This presents an engineering problem that equipment companies are trying to solve. Various types of strip mixing machinery have been developed for operation on or ahead of planters. If they prove successful the use of chemicals for scab control may be practical.

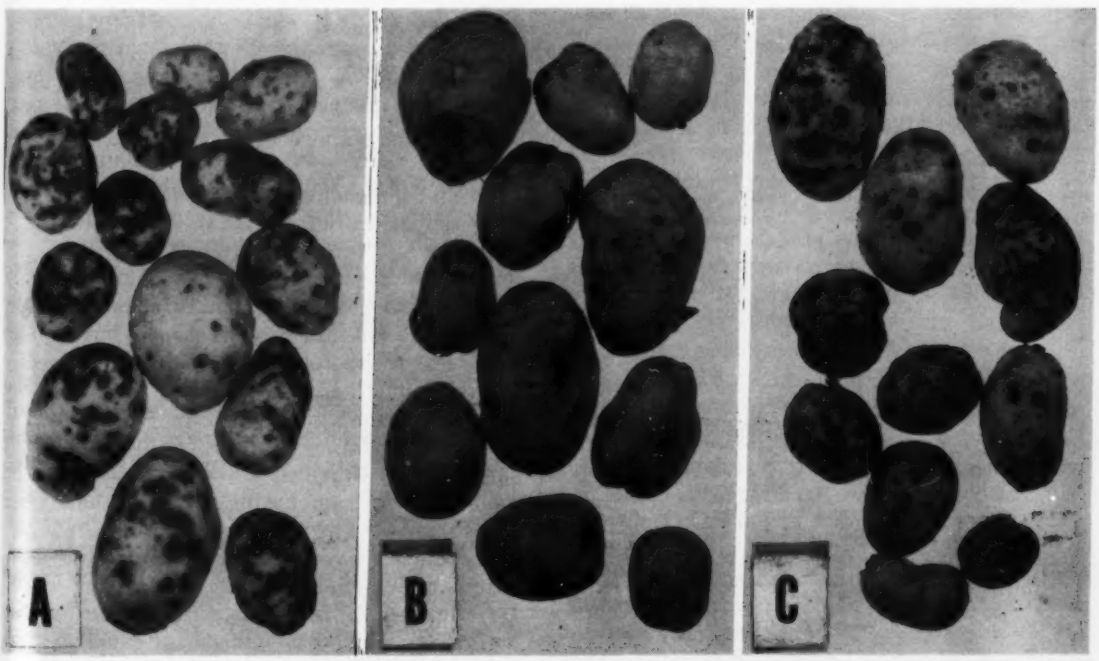
A fascinating possibility for the future is biological control of these soil-borne disease organisms through microbial antagonisms in the soil. It has long been known that certain soil organisms may be suppressed or destroyed by competitive organisms, and that changes in soil conditions favor some but inhibit others. In many cases it has been shown that plant pathogenic organisms are adversely affected by such microbial antagonisms resulting in less disease.

A baffling problem in trying to stimulate these biological effects for disease control is that soil treatments, such as crop sequence or green manures, are not consistent in their action. A practice that stimulates biological control one time may fail to do so the next.

Obviously, we do not know enough about all the factors involved. But such control has been observed in nature so often that there is no doubt about its effectiveness.

We have been doing research on factors affecting survival of the scab organisms in the soil for several years and think that the method will some day be practical. The work started when it was found that certain potato soils were not only non-scabby, but even resisted the establishment of the scab organism. When the microbes of these soils were destroyed by steaming, scab could be easily introduced.

On further investigation in the greenhouse it was found that this scab-suppressing factor could be introduced effectively into scab-infested soil. As little as 1 percent of suppressing soil mixed into scabby soil stopped the development of the scab organism if alfalfa meal was also added as a microbial food source. This extra microbial nutrient is needed to give the suppressing organisms a chance to become established in competition with the microflora al-



Representative samples of potatoes grown in scab-control experiments: (A) untreated soil, (B) treated with alfalfa meal and suppressing soil, (C) treated with alfalfa meal only.

ready active in the scabby soil. Numerous tests have been conducted to show that both ingredients—the right organisms and an extra source of food—are needed before scab is overcome.

So far we have been unable to isolate the organism, or organisms, that are responsible for this biological control. Nor have we yet found out how to repeat the laboratory findings on a field scale. But a start has been made towards understanding and using nature's biological method of reducing the scab organisms in the soil.

Keeping our productive soils free from soilborne pests is an often overlooked conservation problem. As in the case with other conservation efforts, more than one approach can be used. We can slow down these pests by rotations, and avoid much of their damage by using resistant varieties. We can attack them directly with pesticides, and we can manage our soils to stimulate the latent biological control mechanisms that already exist in our soils.

The scab problem shows that there are many difficulties to be overcome before we understand the biological balances that will hold undesired organisms in check. The development of management practices that encourage biological control may eventually provide the best answer.

SERVICING PART-TIME FARMERS.—Many of the cooperators with the Pickens Soil Conservation District in South Carolina work in nearby industrial plants. In order to know when each cooperator is available for contact, F. G. Lindsey, work unit conservationist, records on form 196 the shift on which he works. "And," Lindsey says, "you need also to know the farmer's sleeping habits, for nobody likes to be awakened in the middle of his 'night's' rest to talk about soil conservation."

VERTICAL MULCHING.—Rice hulls, packed into narrow trenches in an alfalfa field, boosted the yield a half ton per acre in one cutting by letting moisture go deeper into the soil.

This test of vertical mulching was made on land with a hardpan layer about 6 inches below the surface, which kept water from penetrating the subsoil.

A subsoiler was used to form the trenches and a special attachment to insert and pack the rice hulls. The trenches were 20 inches deep and 5 feet apart.

J. A. Vomocil and D. W. Henderson, soil and irrigation specialists of the University of California, conducted the experiments.

A Madison Avenue Conservationist

By BERNHARD A. ROTH

ED ZERN, advertising executive, outdoor writer, cartoonist, and conservationist, directs the American Motors Conservation Awards Program (started in 1953 as the Nash Conservation Awards Program).

Ed says: "This is a public relations program, but it's a lot more than that. It's recognition, by one of America's progressive corporations, that conservation of renewable natural resources is the responsibility of business and industry as well as of government and individual citizens. Basically, it is a program intended to put a spotlight on the professional conservationist whose work is seldom understood by the public and whose devotion to his work is matched only by the inadequacy of his salary. In distributing 10 professional and 10 nonprofessional awards, we try to find people whose work has been exceptional in some way but who ordinarily wouldn't get national recognition. For this reason we don't give awards to such relatively well-recognized conservationists as 'Ding' Darling or Olaus Murie, or to a public figure such as Fred Seaton, no matter how much we may approve their conservation action."

Ed and his committee are now making their fifth annual search for what George Romney, president of American Motors, calls "the unsung heroes on the conservation firing-line."

Romney believes that the auto industry has a big stake in natural resource conservation, and that pleasure motoring in America is directly related to maintenance of scenic values as well as conservation values.

American Motors has thus far brightened the outlook of 80 awardees in the United States and Canada. Checks amounting to $20,000 have been distributed to professionals; bronze plaques worth $4,000 have gone to full-time and amateur resource-guardians.

Outdoorsman Zern states that the awards idea dates back to a wilderness canoe trip in

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Note:—The author is an information specialist, Soil Conservation Service, Upper Darby, Pa.

the Adirondacks of New York State. There, he heard about a wildlife biologist working zealously on a problem of deer-herd management. It was a tedious and technical matter of examining animal bones and marrow, determining age, signs of malnutrition, and so on. A job that would hardly make the front page.

When Zern inquired as to the biologist's salary and other rewards, he was appalled by the answers. Then Ed decided to take a good look at an entire gamut of careerists in soil, water, fish, wildlife, and forestry conservation. "We were just plain thunderstruck by the number of individuals doing tremendously important things with no fanfare whatsoever—and usually for mighty little cash."

When he approached George Mason, president of the Nash Kelvinator Corporation (which has since merged with Hudson Motors to become the American Motors Corporation), and suggested a Conservation Awards Program, Mr. Mason approved enthusiastically. Mason was himself a devoted conservationist (national treasurer of "Ducks Unlimited") and, on his death in 1956, he left the property along the famous Ausable River in northern Michigan to the State to be held in perpetuity as a public fishing area.

Zern believes that the far-reaching results of the awards, since American Motors agreed to sponsorship, have been in the terms of public understanding. "We've publicized the awards heavily among hunters, fishermen, and other sportsmen. Some of them have asked why we always try to include soil, water, and forestry people, as well as fish and game men. That gives us and others a chance to explain that you can't have one resource without the other—that true conservation is necessarily a package deal!"

A random sampling of past awardees bears out Zern's assertion. The honor roll lists foresters who have protected wildlife areas from fire in Alaska; wiped out damaging insects in Oregon; improved North Carolina fishing streams by encouraging trees and woody cover on watersheds. And there are game men who have worked for Canadian hunters' safety; wiser bag regulations for West Virginians, and protection of wilderness areas in several States.

The list also reveals an Alabama housewife who got garden clubs to help clean streams; a New Jersey physician who gives free lectures on bird appreciation; several soil conservationists who have helped landowners solve far-reaching flood, erosion, and wildlife problems. And at least one clergyman who convinced his flock that religion and resource-saving go hand in hand.

Ed Zern at one of his favorite avocations.

Unique with the American Motors awards program is its informality and the dashes of humor its director frequently applies to it. Zern is given to tall stories, fly-rods, varmint rifles, and vocalizing folk songs with a Spanish guitar. Unnecessary dignity bores him stiff. In a typical letter, he says, "No, we have no forms to fill out, no pictures to color, no affidavits to sign. Just give us your nomination in a letter, setting forth the nominee's qualifications in whatever detail is reasonable. No credit whatsoever will be given for neatness, spelling, or punctuation."

Since anyone, literally, may nominate anyone else, returns have occasionally swamped Zern and his cohorts with as many as a thousand applicants at a whack. The better, thinks Zern, the chances of finding people who really deserve recognition. Meanwhile, Room 1000, 595 Madison Avenue, New York 22, N. Y., is likely to remain a hotspot in the conservation world.

NATIONAL PLOWING CONTEST AND CONSERVATION EXPOSITION

By IVAN McKEEVER

CONSERVATION leaders from across the Nation will come to the Keystone State for the 16th National Plowing Contest and Conservation Exposition, August 21 and 22, 1958. Over 2,000 acres of the Hershey Chocolate Company farms, Hershey, Pa., have been set aside for the exposition. Ground breaking ceremonies in April launched a crash program which will ready the site for the contest. More than 250,000 spectators are expected to attend the events.

Note:—The author is State Conservationist, Soil Conservation Service, Harrisburg, Pa.

There will be over 8 miles of planned conservation tours showing water and erosion control, agronomy, woodland, and wildlife practices. Six miles of the route will be seen from buses and 2 miles from wagon trains. Twenty-five buses and 90 tractors pulling 180 wagons will haul an expected 30,000 spectators over the demonstration area. Technicians trained in conservation will explain the practices.

Acres of exhibits will carry out the theme of working together through soil conservation districts. Displays will emphasize the role of

Aerial view of conservation farming in Pennsylvania Dutch country near Hershey, Pa.

Federal, State, and local groups in resource conservation in Pennsylvania.

Plowmen will compete for top honors in both level and and contour plowing. Skills in contour plowing will be tested on August 21, and straight furrows will be turned on the 22nd. Winners will compete in the World Plowing Matches in Germany.

Twenty-six acres of new and advanced farm machinery will be open for inspection. Earth movers used in conservation work will be demonstrated.

Federal and State agencies, soil conservation districts, and local groups are teaming with industry and agriculture to make the national event pleasant and educational.

The State Soil Conservation Commission of the State Department of Agriculture is giving overall leadership to the National Plowing Contest and Conservation Exposition. Pennsylvania State University is giving leadership in the handling of the plowing contest.

The Soil Conservation Service, the State Association of Soil Conservation District Directors, and other agencies are mainly responsible for development of the conservation exposition. The Hershey Estates is taking the leadership for local arrangements, finance, and other aspects pertinent to a smooth running program. Newspaper and public relations people are joining in to give publicity and relations work.

Hershey, in the heart of Pennsylvania Dutch Country, is easily reached by air and rail. Major highways pass through the town and the Pennsylvania Turnpike is nearby.

Hundreds of motels, hotels, inns, and tourist homes are arranging to handle the capacity crowd. Reservations are handled by the Hershey Information Bureau, Chocolate Avenue, Hershey, Pa. Restaurants and dining areas are stocking up with shoofly pie, apple-kuchen, and other Dutch foods. Air tours over scenic Pennsylvania Dutch country will be an added attraction.

All of Pennsylvania's 48 soil conservation districts will take some part in making the Conservation Exposition and Plowing Contest a success. Farm equipment companies have accepted an important role—and have helped to attract the forces of related industries such as steel, petroleum, and chemical firms.

The National Plowing Contest and Conservation Exposition is being held in conjunction with the annual Pennsylvania Dutch Days. Famed Dutch handicraft and needlework will be demonstrated. Special exhibits on weeds, grasses, and fertilizers will be included, and dairy-minded visitors will have an opportunity to inspect some of the best dairy herds in the area.

Using The Water Twice

California Irrigators Use Pump-back System to Reuse Tail Water for Irrigating the Same or Adjacent Fields

By HERB BODDY

HANDY, pump-back systems are helping Sacramento County, Calif. farmers and ranchers use just about all of their irrigation water today.

Some 100 irrigators in four soil conservation districts, who reuse irrigation runoff through sump returns, say they like "second-hand" water much better than the tap kind. It's better for crops because it is warmer, richer, and contains plenty of leached fertilizer and manure. This extra waste water helps a lot when water is short and hard to get.

Up to now tail water has been a big loss in California where from 20 to 25 percent of irrigation water runs off at the lower ends of most fields.

Most irrigators, like Antonio Simas, who farms near Galt, try to put all their water to good use. The trick is to keep it from draining off. Some soils take water better than others. So if water doesn't soak in well, it's going to run away, especially if the irrigation runs have too much grade.

Like most ranchers, Tony doesn't like losing a drop of water. For a long time he was hard

Note: The author is information specialist, Soil Conservation Service, Berkeley, Calif.

pressed to find enough of it to go around on his 400 acres of irrigated pasture in the Lower Consumnes Soil Conservation District.

You'd call Tony a smart irrigator. Yet about one-fourth of his water ran off in a natural drain. He tried to apply the right amount of water to each check, but found this wasn't easy since he couldn't keep tab on his irrigator.

Tony's soils are San Joaquin which means they are moderately shallow over hardpan and claypan.

The Galt rancher watched a lot of good irrigation water go down the drain before he got around to putting in his first sump with help from Tim S. Jang, SCS engineer at Florin.

Using a bulldozer, Tony dug out about 13,000 cubic yards of earth in excavating 2 sumps at the lower end of his fields.

Under Tony's system, sump water is lifted by deep well pumps to a 1,222-foot concrete pipeline which carries it to the irrigation line and on to 25-foot spaced checks. Runs are 800 to 1000 ft., while the fall of fields averages .2 ft. per 100 ft.

This spring, Tony started the long 8-month irrigation season with 3 well-filled storage ponds and figures to pump most of the water back on pastures.

Last year, on one 60-acre field, he supplemented his well water with water from 1 sump and estimates he got water on three times as fast. This was due to the difference in water lifts. His 15 horsepower well pump, for example, lifts water 75 ft. to the pipeline, while the smaller 3 to 5 h.p. units pump only 12 ft. or so from water level to standpipes. Then gravity takes the water into the irrigation line. In Sacramento County 3 to 5 h.p. pumps work best.

Tony says: "A few years ago ranchers in Sacramento County had to be sold on return water systems. They just wouldn't buy the idea. Now 'pump-back' systems sell themselves.

"Look at all that water in my ponds, and I have hardly begun to irrigate. Those smaller pumps are going to reduce my power bill and I'll have more water too. I'm counting on irrigating around a fourth of my pasture with tail water—water that used to go to waste. Going to irrigate faster too."

Antonio Simas explains the operation of his 5 h.p. centrifugal pump, used to return tail water from the sump pool for reuse in irrigation, to Tim S. Jang of SCS and L. G. Koerth of county ASC office.

Return water units are for alkali-free lands, and you have to pick the right sites for sumps. Average cost of sumps and return ditches is under $1,000 in Sacramento County.

Cost-sharing ACP funds helped Tony pay for a good part of his pump-back system.

As SCS staffer Jang will tell you, pump-back systems don't come under the head of "do-it-yourself" jobs.

He explains, "Tailwater can be reused on the same field, or on lower fields. You can return tailwater to fields by constructing 'back-graded' ditches and a sump next to the head ditch or pipeline. Water is then lifted by a sump pump, usually a centrifugal or low-lift one, into the head ditch.

"Where back-grading of a return ditch won't work, try locating the sump at the lower end of the field and bringing the water to the head ditch by return pipe. This method costs more than the return ditch.

"When runoff is to be used to irrigate fields below, locate the sump at the lower end of the fields, where the water comes from, and pump it into the pipeline."

There's a rule of thumb way of finding a good sump site. Figure how many acres of pasture will empty tailwater into the sump. Multiply this figure by 20 to get the cubic yards of sump needed. If a return ditch is to go in too, add this yardage. Also if you count on runoff from a neighbor's lands, make an increase in yardage for this.

Sumps and return ditches are easily and cheaply constructed with a carryall when land is dry. For wet soils, your best bet is a dragline or back hoe. Time the sump job with land-leveling work so you can use the extra dirt for fills.

When Tony visited his birthplace in Portugal some time back, he had a good many things to tell the folks about the USA, Sacramento, and his well-managed pastures.

"But", he mused, "wait until I tell them about the luck I'm having with tailwater and sumps."

CONSERVATION IS A CONTINUING ACTIVITY. Our population is growing. Our economy is expanding. The pressures on our land resources are increasing. The need for managing these resources to protect and improve them is getting greater every year.

—Donald A. Williams, Administrator,
Soil Conservation Service

Water For Tomorrow

Farmer-operated Irrigation District Installs a $200,000 Concrete Siphon to Carry Water to 78 Farms

By V. LENNIE HUSA,
AUGUST L. BONJORNI,
and HOWARD C. BRANSON

THE farmer-operated Gardena Irrigation District near the Washington-Oregon State line, about 20 miles southeast of Walla Walla, Wash., had a serious maintenance problem. Howard Barnes, Dan Fisk, and Jennings Johnson, irrigation district directors, were charged with the responsibility of maintaining a 25-mile canal system, with numerous concrete grade control and diversion structures, and a critically important 7,621 foot long, 44-inch wood stave siphon.

An old wooden siphon joined the canal system between two hilltops, 163 and 130 feet high. It was beginning to feel the effects of old age and 26 years of useful, productive service. The wood staves and closely spaced steel bands were beginning to fail at an increasingly alarming rate. Something major had to be done in the way of siphon replacement if irrigation of the 5,374 acres of land below the siphon was to be continued. These 78 farming units that raised alfalfa, grass, grain, and sugar beets depended on the siphon carrying the water for their very existence.

E. C. Burlingame investigated the virgin area on horseback, and later designed and laid out the original canal system in 1910. He is credited with much of the early beginning of irrigation in this 7 to 8 inch annual rainfall area.

The irrigation district directors, with their ditch supervisor, "Pete" Hanson, contacted Gerald Thola, SCS work unit conservationist assisting the South Walla Walla Soil Conservation District, for engineering and planning as-

Note:—The authors are respectively area engineer, engineering aid, and conservation aid, Soil Conservation Service, Colfax, Wash.

A break in the wooden Pine Creek siphon that forced its replacement with a concrete siphon.

sistance. The SCS investigation included running surveys of the project site and checking siphon materials available. Proposals with cost and benefit estimates were prepared for the irrigation district directors.

After a review of the proposals, the directors decided on 45 or 48 inch reinforced concrete or concrete cylinder pipe. SCS engineers prepared final plans and specifications for these alternates, and on November 12, 1956, the district opened advertised bids on the project.

Bids from 9 contracting firms ranged from $215,179 to $354,578. The bids, reflecting a recent steel price rise, greatly exceeded the district's cost expectations.

The directors' plan for financing the program was to sell bonds to pay for the project immediately and then set up a repayment plan over a period of years by increasing assessments to the water users. The Washington State Department of Conservation and Development had agreed to purchase up to $200,000 worth of bonds. The bids so exceeded the money available that at first the directors were at a loss as to what to do.

They then decided to negotiate with the lowest bidder, the M. F. Castle Company of Spokane, Wash. An agreement was reached and a 42-inch concrete cylinder pipe was selected for installation.

Fitting sections of the concrete siphon together before sealing the joints.

Excavation of the ditch for the Pine Creek concrete siphon.

To help reduce the cost, two other concessions had to be made. They were: First, the irrigation district was to remove and dispose of the old siphon; and second, the existing inlet and outlet structures were to be used even though this meant sacrificing some flow efficiencies. Removing the old siphon with its 100 tons of scrap iron wasn't a small chore; however, the material salvaged help pay for the cost of removal. The final cost of the project amounted to $199,759.01.

The installed 42-inch pipe is composed of a 12 gauge steel pipe liner with ¾ inch of spun

concrete on the interior, and with a 5/16 inch steel wire wound spirally about the steel cylinder. The liner and wire is covered with a 1-inch covering of spun concrete on the outside. Each 32-foot section of pipe weighs approximately 5 tons. It has a life expectancy of 100 years.

Installation of the new siphon was started in February 1957, under the supervision of SCS engineers. This was none too soon as far as the old siphon was concerned. A final break in the old wood stave siphon had occurred the previous October when a hole 50 feet across, and 7 to 8 feet deep, was torn out by escaping water. Broken steel bands were picked up as far as 80 feet away from the break.

From the middle of February to the middle of April, the old siphon was removed and disposed of; the trench dug, pipe laid, backfill placed, and inspection completed.

The old siphon originally went over Pine Creek on a trestle. To eliminate the hazard of annual flood waters to the new pipe, however, it was placed underground all the way.

The final pipe section was laid on April 12, and water for irrigation was turned into the system on April 13, 1957. The worries of "no water—no crop" were discarded with the old wooden siphon.

TIMBER RESOURCES FOR AMERICA'S FUTURE. By the Forest Service. USDA Forest Resources Report No. 14. 713 pp. Illustrated. 1958. Washington, D. C.: U. S. Government Printing Office. $7.00.

THIS is the most elaborate report of any of the timber appraisal reports made by the Forest Service. Doubtless, it is also the most complete of all resource appraisal reports and should serve as a model for future reports on other American resources.

This report and its interpretation is presented as a "State Of The Union" message on our national timber supplies by the Forest Service.

Several reasons for making this Timber Resources Review are listed. One of the most significant reasons is that the post World War II period appeared to mark a rapid acceleration in American forestry. Thousands of private forest owners showed a heightened interest in growing timber. There was fuller utilization of the timber harvest, and new gains were achieved in forest protection.

The impact of these and other changes in the national forestry effort pointed towards a new look at the timber situation.

One of the other changes which could have been listed for example is the demand for wood and the development of markets for wood. This made it profitable for private landowners to grow wood as a crop.

The post World War II decade will prove to be the period during which there has been a general public acceptance of the fact that both old growth and public timber have not been supplying the Nation's woodbox.

It is encouraging to have interpretations that point to the significance of privately owned land as the primary source of our future wood supplies. "The key to adequate timber supplies in the future lies with the 4.5 million farm and 'other' private holdings. Although they own mainly small tracts of forest land and their principal interests are not growing timber, in the aggregate, they control well over half the Nation's commercial timberland, and they must continue to supply a substantial portion of the raw materials for the forestry industry. Industrial and public ownerships alone do not have the capacity to sustain future timber demands."

This fact offers opportunities to private owners that will encourage them to use their resources—land, labor, and capital—to grow wood for America's wood-using industries.

Growing wood as a crop is now a business for many landowners. There is adequate historical evidence to create a great confidence among investors in wood-using industries that landowners can and will grow the raw materials needed by the industries. They have the land and will acquire the know-how necessary to grow the crops just as fast as they are given the necessary incentive—and not any faster. They have done it with other crops—quite adequately—even to excess. They can do it with wood.

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Certainly this report should be available to all persons interested in forest industries, either in private or public programing of land uses, and in conservation use of the wood crops grown on our basic resource—the soil.

—T. B. PLAIR

ROCKS AND RAIN AND THE RAYS OF THE SUN. By William Fox. 90 pp. Illustrated. 1958. New York: Henry Z. Walck, Inc. $3.00.

A beautifully illustrated book about the natural resources we enjoy but take for granted. The text gives an accurate and concise account of rocks and rain and the other natural resources affected by the sun's rays.

The author points out that it is good to know about our resources and then use them without waste. They are for our use, but also for those people who will come after us. It is a challenge to know more about all of our natural resources and how we are dependent on them.

This book should be especially good for elementary and junior high school age groups but will interest older readers.

—FAIR GRIFFIN

SOILS: An Introduction to Soils and Plant Growth. By Roy L. Donahue. 349 pp. Illustrated. 1958. Englewood Cliffs, N. J.: Prentice-Hall, Inc. $6.75.

BOOKS on general soil science that are both balanced and simple are very scarce. Dr. Donahue has given us a good one. He sets out the main principles and examples of their practical application with an economy of words. Knowledge of chemistry beyond the meaning of the chemical symbols is not required. In about 130 pages he deals simply and effectively with fundamental principles; 182 pages are devoted to soil management and conservation; and, the rest is used for glossary and index.

To keep the discussion balanced, he has had to make many difficult decisions. Although probably none of us would have given the same exact emphasis to the several aspects, he has done the job well in terms of the most important current ideas.

This book should be especially good for elementary text or as a reader for those needing a general review of the subject without extensive scientific preparation.

The text is unusually well-illustrated with photographs, simple charts, and drawings.

—C. E. KELLOGG

DOUBLE TROUBLE.—In the Vosges Mountains of France, topsoil is washed down to the valley each year. At the end of the growing season, the farmers get out their shovels, go down to the valley, put the soil into baskets, and then carry it up to the mountains on their backs, so it can be replaced!

Seems as if they're doing it the hard way. It's a whole lot easier to keep the soil where it belongs in the first place, by using the right soil conservation measures.

—*The Conservation Volunteer*

CONSERVATION IS FOR PEOPLE.—Conservation of soil and water, trees and grass, is meaningless unless it is done for people, to provide the things people need —food, clothing, building materials, and even recreation. Conservation will not succeed unless our people understand it.

—Ezra Taft Benson,
Secretary of Agriculture